Euro. App. as filed

Empfangsbescheinigung / Receipt for documents / Récépissé de documents

6

(Liste der diesem Antrag beigefügten Unterlagen) (Checklist of enclosed documents) (Liste des documents annexés à la présente requête)

Es wird hiermit der Empfang der unten bezeichneten Dokumente bescheinigt / Receipt of the documents indicated below is hereby acknowledged / Nous attestons le dépôt des documents désignés ci-dessous

Wird im Falle der Einreichung der europäischen Patentanmeldung bei einer nationalen Behörde diese Empfangsbescheinigung vom Europäischen Patentamt übersandt, so ist sie als Mitteilung gemäß Regel 24(4) anzusehen (siehe Feld RENA). **Nach Erhalt der Mitteilung nach Regel 24(4) sind alle weiteren Unterlagen, die die Anmeldung betreffen, nur noch unmittelbar beim EPA einzureichen.** / If this receipt is issued by the European Patent Office and the European patent application was filed with a national authority it serves as a communication under Rule 24(4) (see Section RENA). **Once the communication under Rule 24(4) has been received, all further documents relating to the application must be sent directly to the European Patent Office.** / Si, en cas de dépôt de la demande de brevet européen auprès d'un service national, l'Office européen des brevets délivre le présent récépissé de documents, ce récépissé est réputé être la notification visée à la règle 24(4) (cf. rubrique RENA). **Dès que la notification visée à la règle 24(4) a été reçue, tous les autres documents relatifs à la demande doivent être adressés directement à l'OEB.**

Dr. Claus Dendorfer
Wächtershäuser & Hartz
Tal 29

80331 München

Nur für amtlichen Gebrauch / For official use only / Cadre réservé à l'administration

Datum / Date

Europäisches Patentamt
European Patent Office
Office européen des brevets
D-80298 München

Unterschrift S. Dicksved / Cachet officiel

Anmeldenummer / Application No. / N° de la demande			00118676.6
Tag des Eingangs (Regel 24(2)) / Date of receipt (Rule 24(2)) / Date de réception (règle 24(2))	DREC		29.08.00
Zeichen des Anmelders/Vertreters / Applicant's/ Representative's ref. / Référence du demandeur ou du mandataire	AREF		
Nur nach Einreichung der Anmeldung bei einer nationalen Behörde: / Only after filing of the application with a national authority: / Seulement après le dépôt de la demande auprès d'un service national:			
Tag des Eingangs beim EPA (Regel 24(4)) / Date of receipt at EPO (Rule 24(4)) / Date de réception à l'OEB (règle 24(4))	RENA		

J1040 U.S. PTO 09/941373 08/28/01

		47	Stückzahl / Number of copies / Nombre d'exemplaires	Blattzahl* eines Stücks / Number of sheets* in each copy / Nombre de feuilles* par exemplaire	Gesamtzahl der Abbildungen* / Total number of figures* / Nombre total de figures*
A.	**Anmeldungsunterlagen und Prioritätsbeleg(e) / Application documents and priority document(s) / Pièces de la demande et document(s) de priorité**				
1.	Beschreibung (ohne Sequenzprotokollteil) / Description (excluding sequence listing part) / Description (sauf partie réservée au listage des séquences)		3	11	
2.	Patentansprüche / Claim(s) / Revendication(s)		3	2	
3.	Zeichnung(en) / Drawing(s) / Dessin(s) DRAW 1 #		3	4	16
4.	Sequenzprotokollteil der Beschreibung / Sequence listing part of description / Partie de la description réservée au listage des séquences				
5.	Zusammenfassung / Abstract / Abrégé		3	1	
6.	Übersetzung der Anmeldungsunterlagen / Translation of the application documents / Traduction des pièces de la demande				
7.	Prioritätsbeleg(e) / Priority document(s) / Document(s) de priorité				
8.	Übersetzung des (der) Prioritätsbelegs(belege) / Translation of priority document(s) / Traduction du (des) document(s) de priorité				

		48	
B.	**Der Anmeldung in der eingereichten Fassung liegen folgende Unterlagen bei: / This application as filed is accompanied by the items below: / A la présente demande sont annexées les pièces suivantes:**		
1.	Einzelvollmacht / Specific authorisation / Pouvoir particulier		
2.	Allgemeine Vollmacht / General authorisation / Pouvoir général		
3.	Erfindernennung / Designation of inventor / Désignation de l'inventeur		
4.	Früherer Recherchenbericht / Earlier search report / Rapport de recherche antérieure		
5.	Gebührenzahlungsvordruck (EPA Form 1010) / Voucher for the settlement of fees (EPO Form 1010) / Bordereau de règlement de taxes (OEB Form 1010)	X	Währung Betrag / Currency Amount / Monnaie Montant (Ausfüllung freigestellt / optional / facultatif) EUR 877,--
6.	Scheck *(nicht bei Einreichung bei den nationalen Behörden)* / Cheque *(not when filing with national authorities)* / Chèque *(pas de chèque en cas de dépôt auprès des services nationaux)*		
7.	Datenträger für Sequenzprotokoll / Data carrier for sequence listing / Support de données pour liste de séquences SEQL 4		
8.	Zusatzblatt / Additional sheet / Feuille additionnelle		
9.	Sonstige Unterlagen (bitte hier spezifizieren) / Other documents (please specify here) / Autres documents (veuillez préciser)		
C.	**Kopien dieser Empfangsbescheinigung / Copies of this receipt for documents / Copies du présent récépissé de documents**	49	2 Anzahl der Kopien / Number of copies / Nombre de copies

* Die Richtigkeit der Angabe der Blattzahl und der Gesamtzahl der Abbildungen wurde bei Eingang nicht geprüft / No check was made on receipt that the number of sheets and the total number of figures indicated were correct / L'exactitude du nombre de feuilles et du nombre total de figures n'a pas été contrôlée lors du dépôt

CED-11227

Raum für Zeichen des Anmelders / Space for applicant's reference / Espace réservé à la référence du demandeur

Antrag auf Erteilung eines europäischen Patents / Requ st for grant of a European patent / Requête en délivranc d'un br vet europ´en

Bestätigung einer bereits durch Telefax eingereichten Anmeldung / Confirmation of an application already filed by facsimile / Confirmation d'une demande déjà déposée par téléfax
Wenn ja, Datum der Übermittlung des Telefax und Name der Einreichungsbehörde / If yes, facsimile date and name of the authority with which the documents were filed / Si oui, date d'envoi du téléfax et nom de l'autorité de dépôt

☐ Ja / Yes / Oui

Datum / Date | Behörde / Authority / Autorité

Nur für amtlichen Gebrauch / For official use only / Cadre réservé à l'administration

Anmeldenummer / Application No. / N° de la demande	MKEY	1	
Tag des Eingangs (Regel 24(2)) / Date of receipt (Rule 24(2)) / Date de réception (règle 24(2))	DREC	2	
Tag des Eingangs beim EPA (Regel 24(4)) / Date of receipt at EPO (Rule 24(4)) / Date de réception à l'OEB (règle 24(4))	RENA	3	
Anmeldetag / Date of filing / Date de dépôt		4	

Tabulatoren-Positionen / Tabulation marks / Arrêts de tabulation

Es wird die Erteilung eines europäischen Patents und gemäß Artikel 94 die Prüfung der Anmeldung beantragt / Grant of a European patent, and examination of the application under Article 94, are hereby requested / Il est demandé la délivrance d'un brevet européen et, conformément à l'article 94, l'examen de la demande — EXAM 4 — 5

☒ *Prüfungsantrag in einer zugelassenen Nichtamtssprache (siehe Merkblatt II, 5): / Request for examination in an admissible non-EPO language (see Notes II,5): / Requête en examen dans une langue non officielle autorisée (voir notice II,5):*

Zeichen des Anmelders oder Vertreters (max. 15 Positionen) / Applicant's or representative's reference (maximum 15 spaces) / Référence du demandeur ou du mandataire (max. 15 caractères ou espaces) — AREF — 6: CED-11227

Anmelder / Applicant / Demandeur

Name / Nom — 7: RedSpark, Inc.

Anschrift / Address / Adresse — 8:

APPR 01 #

DEST

642 Harrison Street
San Francisco, CA 94107
USA

Zustellanschrift / Address for correspondence / Adresse pour la correspondance — 9

PADR

Staat des Wohnsitzes oder Sitzes / State of residence or of principal place of business / Etat du domicile ou du siège — 10: USA (US)

Staatsangehörigkeit / Nationality / Nationalité — 11: USA (US)

Telefon / Telephone / Téléphone — 12:

Telex / Télex | Telefax / Fax / Téléfax — 13:

Weitere(r) Anmelder auf Zusatzblatt / Additional applicant(s) on additional sheet / Autre(s) demandeur(s) sur feuille additionnelle — 14: ☐

Vertreter / Representative / Mandataire

Name / Nom — 15: DENDORFER Claus

(**Nur einen** Vertreter angeben, der in das europäische Patentregister eingetragen ist und an den zugestellt wird / Name **only one** representative who is to be listed in the Register of European Patents and to whom notification is to be made / N'indiquer qu'**un seul** mandataire, qui sera inscrit au Registre européen des brevets et auquel signification sera faite)

FREP 01 # # #

Geschäftsanschrift / Address of place of business / Adresse professionnelle — 16:

Wächtershäuser & Hartz
Tal 29
D-80331 München
Germany

Telefon / Telephone / Téléphone — 17: +49-89-21 99 76-0

Telex / Télex | Telefax / Fax / Téléfax — 18: | +49-89-22 37 59

Weitere(r) Vertreter auf Zusatzblatt / Additional representative(s) on additional sheet / Autre(s) mandataire(s) sur feuille additionnelle — 19: ☐

Vollmacht / Authorisation / Pouvoir

ist beigefügt / is enclosed / joint — 20 ☐

ist registriert unter Nummer / has been registered under No. / a été enregistré sous le n° — GENA — 21 ☐ Nummer / Number / Numéro

Erfinder / Inventor / Inventeur — INVT 20 # #

Anmelder ist (sind) alleinige(r) Erfinder / The applicant(s) is (are) the sole inventor(s) / Le(s) demandeur(s) est (sont) le (les) seul(s) inventeur(s) — 22 ☐

Erfindernennung in gesondertem Schriftstück / Designation of inventor attached / Voir la désignation de l'inventeur ci-jointe — 23 ☐

Bezeichnung der Erfindung / Title of invention / Titre de l'invention — 24

TIDE | TIEN | TIFR

Providing and using predefined part data for a CAD program

Prioritätserklärung / Declaration of priority / Déclaration de priorité — PRIO — 25

	Staat / State / Etat	Anmeldetag / Date of filing / Date de dépôt	Aktenzeichen / Application No. / N° de la demande
01 # . . # . . . . . #	1		
02 # . . # . . . . . #	2		
03 # . . # . . . . . #	3		
04 # . . # . . . . . #	4		

Weitere Prioritätserklärung(en) auf Zusatzblatt / Additional declaration(s) of priority on additional sheet / Autre(s) déclaration(s) de priorité sur feuille additionnelle — ☐

Es wird hiermit erklärt, daß die Anmeldung eine vollständige Übersetzung der früheren Anmeldung ist (Regel 38(4) / It is hereby declared that the application is a complete translation of the previous application (Rule 38(4) / Il est déclaré par la présente que la demande est une traduction intégrale de la demande antérieure (règle 38(4) — PRIO 6 — 25a ☐

Biologisches Material

Die Erfindung bezieht sich auf bzw. verwendet biologisches Material, das nach Regel 28 hinterlegt worden ist.

Biological material

The invention relates to and/or uses biological material deposited under Rule 28.

Matière biologique

L'invention concerne et/ou utilise de la matière biologique, déposée conformément à la règle 28. — 26 ☐

Die Angaben nach Regel 28(1)c) (falls noch nicht bekannt, die Hinterlegungsstelle und das (die) Bezugszeichen [Nummer, Symbole usw.] des Hinterlegers) sind in den technischen Anmeldungsunterlagen enthalten auf / The particulars referred to in Rule 28(1)(c) (if not yet known, the depository institution and the identification reference(s) [number, symbols etc.] of the depositor) are given in the technical documents in the application on / Les indications visées à la règle 28(1)c) (si pas encore connues, l'autorité de dépôt et la (les) référence(s) d'identification [numéro ou symboles etc.] du déposant) figurent dans les pièces techniques de la demande à la /aux

BIOM 1 # | | | | | | #

Seite(n) / page(s)	Zeile(n) / line(s) / ligne(s)

27

werden später mitgeteilt / will be submitted later /seront communiquées ultérieurement — 27a ☐

Die Empfangsbescheinigung(en) der Hinterlegungsstelle ist (sind) beigefügt / The receipt(s) of deposit issued by the depositary institution is (are) enclosed / Le(s) récépissé(s) de dépôt délivré(s) par l'autorité de dépôt est (sont) joint(s) — 27b ☐

wird (werden) nachgereicht / will be filed later /sera (seront) produit(s) ultérieurement — 27c ☐

Falls das biologische Material nicht vom Anmelder, sondern von einem Dritten hinterlegt wurde: / Where the biological material has been deposited by a person other than the applicant: / Lorsque la matière biologique a été déposée par une personne autre que le demandeur:

Ermächtigung nach Regel 28(1)d) / Authorisation under Rule 28(1)(d) / L'autorisation en vertu de la règle 28(1)d)

ist beigefügt / is enclosed / est jointe — 28a ☐

wird nachgereicht / will be filed later / sera produite ultérieurement — 28b ☐

28 Name und Anschrift des Hinterlegers / Name and address of depositor / Nom et adresse du déposant :

Verzicht auf die Verpflichtung des Antragstellers nach Regel 28(3) in gesondertem Schriftstück / Waiver of the right to an undertaking from the requester pursuant to Rule 28(3) attached

29 ☐ Renonciation, sur document distinct, à l'engagement du requérant au titre de la règle 28(3)

Gemäß Regel 28(4) wird hiermit mitgeteilt, daß der Zugang zu dem in den Feldern 26 und 27 genannten biologischen Material nur durch Herausgabe einer Probe an einen Sachverständigen hergestellt wird / It is hereby declared under Rule 28(4) that the availability of the biological material referred to in Sections 26 and 27 shall be effected only by the issue of a sample to an expert

BIOM 3

30 ☐ Conformément à la règle 28(4) il est déclaré par la présente que l'accessibilité à la matière biologique mentionée aux rubriques 26 et 27 ne peut réalisée que par la remise d'un échantillon à un expert

Nucleotid- und Aminosäuresequenzen / Nucleotide and amino acid sequences / Séquences de nucléotides et d'acides aminés

SEQL 1

31

Die Beschreibung enthält ein Sequenzprotokoll nach Regel 27a(1) / The description contains a sequence listing in accordance with Rule 27a(1) / La description contient une liste de séquences selon la règle 27bis(1) ☐

Der vorgeschriebene Datenträger ist beigefügt / The prescribed data carrier is enclosed / Le support de données prescrit est joint ☐

Es wird hiermit erklärt, daß die auf dem Datenträger gespeicherte Information mit dem schriftlichen Sequenzprotokoll übereinstimmt (Regel 27a(2)) / It is hereby stated that the information recorded on the data carrier is identical to the written sequence listing (Rule 27a(2)) / Il est déclaré par la présente que l'information figurant sur le support de données est identique à celle que contient la liste de séquences écrite (règle 27bis(2)) ☐

Benennung der Vertragsstaaten und Erklärungen hierzu

Designation of contracting states and associated declarations

DEST

32

Désignation d'Etats contractants et déclarations à ce propos

1. Hiermit werden sämtliche Vertragsstaaten des EPÜ benannt, die diesem bei Einreichung dieser Anmeldung angehören*.

   Mit der Zahlung des **siebenfachen** Betrags einer Benennungsgebühr gelten die Benennungsgebühren für alle Vertragsstaaten als entrichtet (Art. 2 Nr. 3 GebO).

1. All states which are contracting states to the EPC at the filing of this application are hereby designated*.

   Payment of **seven times** the amount of the designation fee is deemed to constitute payment of the designation fees for all the contracting states (Art. 2, No. 3, RFees).

☒ 1. Sont désignés tous les Etats qui sont des Etats contractants de la CBE à la date du dépôt de la présente demande*.

Les taxes de désignation sont réputées acquittées pour tous les Etats contractants dès lors qu'un montant correspondant à **sept fois** la taxe de désignation a été acquitté (art. 2, point 3 du RRT).

2. Es ist derzeit beabsichtigt, **weniger als sieben**Benennungsgebühren für folgende Vertragsstaaten zu entrichten *(bitte Ländercodes und Vertragsstaaten angeben*):*

2. It is currently intended to pay **fewer than seven**designation fees for the following contracting states *(please indicate country codes and contracting states*):*

☐ 2. Il est actuellement envisagé de payer **moins de sept** taxes de désignation pour les Etats contractants suivants *(prière d'indiquer codes de pays et Etats contractants*) :*

(1) ☐ _____ (4) ☐ _____

(2) ☐ _____ (5) ☐ _____

(3) ☐ _____ (6) ☐ _____

Es wird beantragt, für die unter Nr. 2 nicht aufgeführten Vertragsstaaten von der Zustellung von Mitteilungen nach Regel 85a(1) und Regel 69(1) abzusehen.

No communications under Rules 85a(1) or 69(1) need be notified in respect of the contracting states not indicated under No. 2.

Prière de ne pas procéder à la signification des notifications prévues par les règles 85bis(1) et 69(1) pour les Etats contractants n'ayant pas été mentionnés au n° 2.

3. Wird ein **automatischer Abbuchungsauftrag** erteilt (Feld 43), so wird das EPA beauftragt, bei Ablauf der Grundfrist nach Artikel 79(2) den siebenfachen Betrag einer Benennungsgebühr abzubuchen. Ist eine Erklärung unter Nr. 2 abgegeben worden, so sollen die Benennungsgebühren nur für die dort angegebenen Vertragsstaaten abgebucht werden, sofern dem EPA nicht bis zum Ablauf der Grundfrist ein anderslautender Auftrag zugeht.

3. If an **automatic debit order** has been issued (Section 43), the EPO is authorised, on expiry of the basic period under Article 79(2), to debit seven times the amount of the designation fee. If any states are indicated under No. 2, the EPO shall debit designation fees only for those states, unless it is instructed to do otherwise before expiry of the basic period.

☒ 3. Si un **ordre de prélèvement automatique** est donné (rubrique 43), il est demandé à l'OEB de prélever, à l'expiration du délai normal visé à l'article 79(2), un montant correspondant à sept fois la taxe de désignation. Si une déclaration a été faite au n° 2, les taxes de désignation ne sont prélevées que pour les Etats contractants qui y sont indiqués, sauf instruction contraire reçue par l'OEB avant l'expiration du délai normal.

* Stand bei Drucklegung: 19 Vertragsstaaten, und zwar: / Status when this form was printed: 19 contracting states, namely / Situation à la date d'impression : 19 Etats contractants, à savoir : **AT** Österreich / Austria / Autriche, **BE** Belgien / Belgium / Belgique, **CH/LI** Schweiz und Liechtenstein / Switzerland and Liechtenstein / Suisse et Liechtenstein, **CY** Zypern / Cyprus / Chypre, **DE** Deutschland / Germany / Allemagne, **DK** Dänemark / Denmark / Danemark, **ES** Spanien / Spain / Espagne, **FI** Finnland / Finland / Finlande, **FR** Frankreich / France / France, **GB** Vereinigtes Königreich / United Kingdom / Royaume-Uni, **GR** Griechenland / Greece / Grèce, **IE** Irland / Ireland / Irlande, **IT** Italien / Italy / Italie, **LU** Luxemburg / Luxembourg / Luxembourg, **MC** Monaco / Monaco / Monaco, **NL** Niederlande / Netherlands / Pays-Bas, **PT** Portugal / Portugal / Portugal, **SE** Schweden / Sweden / Suède

Verschiedene Anmelder für verschiedene Vertragsstaaten /
Different applicants for different contracting states /
Différents demandeurs pour différents Etats contractants

APPR 02 # | | | | | | | # | | | | | | | | | |

33 Name(n) des (der) Anmelder(s) und benannte Vertragsstaaten /
Name(s) of applicant(s) and designated contracting states /
Nom(s) du (des) demandeur(s) et des Etats contractants désignés

Erstreckung des europäischen Patents

Diese Anmeldung gilt als Antrag, die europäische Patentanmeldung und das darauf erteilte europäische Patent auf alle Nicht-Vertragsstaaten des EPÜ zu erstrecken, mit denen am Tag ihrer Einreichung „Erstreckungsabkommen" bestehen (derzeit: Albanien, Litauen, Lettland, Rumänien, Slowenien, ehemalige jugoslawische Republik Mazedonien). Die Erstrekkung wird jedoch nur wirksam, wenn die vorgeschriebene Erstreckungsgebühr entrichtet wird.

Extension of the European patent

This application is deemed to be a request to extend the European patent application and the European patent granted in respect of it to all non-contracting states to the EPC with which "extension agreements" exist on the date on which the application is filed (Present situation: Albania, Lithuania, Latvia, Romania, Slovenia, former Yugoslav Republic of Macedonia). However, the extension only takes effect if the prescribed extension fee is paid.

EXPT

34 **Extension des effets du brevet européen**

☒ La présente demande est réputée constituer une requête en extension des effets de la demande de brevet européen et du brevet européen délivré sur la base de cette demande à tous les Etats non parties à la CBE avec lesquels il existe un «accord d'extension» à la date du dépôt de la demande (Situation actuelle : Albanie, Lituanie, Lettonie, Roumanie, Slovénie, ex-République yougoslave de Macédoine). Toutefois, l'extension ne produit ses effets que s'il est acquitté la taxe d'extension prescrite.

Es ist derzeit beabsichtigt, die Erstreckungsgebühr für die nachfolgend angekreuzten Staaten zu entrichten: / It is currently intended to pay the extension fee for the states marked below with a cross: / Il est actuellement envisagé de payer la taxe d'extension pour les Etats dont le nom est coché ci-après :

Albanien / Albania / Albanie	AL ☐
Litauen / Lithuania / Lituanie	LT ☐
Lettland / Latvia / Lettonie	LV ☐
Rumänien / Romania / Roumanie	RO ☐
Slowenien / Slovenia / Slovénie	SI ☐
Ehemalige jugoslawische Republik Mazedonien / Former Yugoslav Republic of Macedonia / Ex-République yougoslave de Macédoine	MK ☐
_____	____ ☐
_____	____ ☐

(Platz für Staaten, mit denen nach Drucklegung dieses Formblatts „Erstreckungsabkommen" in Kraft treten) / (Space for states with which "extension agreements" enter into force after this form has been printed) / (Prévu pour des Etats à l'égard desquels des «accords d'extension» entreront en vigueur après l'impression du présent formulaire)

Die Anmeldung ist eine Teilanmeldung /
The application is a divisional application /
La présente demande constitue une demande divisionnaire

DFIL 9 | | | | | | # |
PANR | | | | | | | | # |

35 ☐ _____ Nummer der früheren Anmeldung / No. of earlier application / Numéro de la demande initiale

Es handelt sich um eine Anmeldung nach Artikel 61(1)b) /
The application is an Article 61(1)(b) application /
La présente demande constitue une demande selon l'article 61(1)b)

DFIL 9 | | | | | | # |
EANR | | | | | | | | # |

36 ☐ _____ Nummer der früheren Anmeldung / No. of earlier application / Numéro de la demande initiale

Patentansprüche / Claims / Revendications CLMS

37 11 Zahl der Patentansprüche / Number of claims / Nombre de revendications

Zur Veröffentlichung mit der Zusammenfassung wird vorgeschlagen Abbildung Nr. /
It is proposed that the abstract be published together with figure No. /
Il est proposé de publier avec l'abrégé la figure n°

DRAW 2

39 6 Nummer / Number / Numéro

CED-11227

Raum für Zeichen des Anmelders / Space for applicant's reference / Espace réservé à la référence du demandeur

Zusätzliche Abschrift(en) der im europäischen Recherchenbericht angeführten Schriftstücke wird (werden) beantragt /
Additional copy(ies) of the documents cited in the European search report is (are) requested /
Prière de fournir une (des) copie(s) supplémentaire(s) des documents cités dans le rapport de recherche européenne

ASOC

40 | 1 | Anzahl der **zusätzlichen** Sätze von Abschriften / Number of **additional** sets of copies / Nombre de jeux **supplémentaires** de copies

Es wird die Rückerstattung der Recherchengebühr gemäß Art. 10 GebO beantragt / Refund of the search fee is requested pursuant to Article 10 of the Rules relating to Fees / Le remboursement de la taxe de recherche est demandé en vertu de l'article 10 du règlement relatif aux taxes

41 ☐

Eine Kopie des Recherchenberichts ist beigefügt /
A copy of the search report is attached /
Une copie du rapport de recherche est jointe

42 ☐

Automatischer Abbuchungsauftrag
(nur möglich für Inhaber von beim EPA geführten laufenden Konten)

Das EPA wird hiermit beauftragt, fällig werdende Gebühren und Auslagen nach Maßgabe der Vorschriften über das automatische Abbuchungsverfahren vom nebenstehenden laufenden Konto abzubuchen. In bezug auf die **Benennungsgebühren** wird auf Feld 32.3 verwiesen. Das EPA wird ferner beauftragt, die **Erstreckungsgebühren** für jeden in Feld 34 angekreuzten »Erstreckungsstaat« bei Ablauf der Grundfrist zu ihrer Zahlung abzubuchen, sofern ihm nicht bis dahin ein anderslautender Auftrag zugeht.

Automatic debit order
(for EPO deposit account holders only)

The EPO is hereby authorised, under the Arrangements for the automatic debiting procedure, to debit from the deposit account opposite any fees and costs falling due. With regard to **designation fees** reference is made to Section 32.3. The EPO is also authorised, on expiry of the basic period for its payment, to debit the **extension fee** for each of the "extension states" marked with a cross in Section 34, unless it is instructed to do otherwise before expiry of this period.

43

Ordre de prélèvement automatique
(possibilité offerte uniquement aux titulaires de comptes courants ouverts auprès de l'OEB)

Par la présente, il est demandé à l'OEB de prélever du compte courant ci-dessous les taxes et frais venant à échéance, conformément à la réglementation relative à la procédure de prélèvement automatique. Pour les **taxes de désignation,** se reporter à la rubrique 32.3. Il est en outre demandé à l'OEB de prélever, à l'expiration du délai normal prévu pour leur paiement, les **taxes d'extension** pour chaque «Etat autorisant l'extension» coché à la rubrique 34, sauf instruction contraire reçue avant l'expiration de ce délai.

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44 | 2800 0877 | DENDORFER Claus

Die vorgeschriebene Liste über die diesem Antrag beigefügten Unterlagen ergibt sich aus der vorbereiteten Empfangsbescheinigung (Seite 6 dieses Antrages)

The prescribed list of documents enclosed with this request is shown on the prepared receipt (page 6 of this request)

45 La liste prescrite des documents joints à cette requête figure sur le récépissé préétabli (page 6 de la présente requête)

Unterschrift(en) des (der) Anmelder(s) oder Vertreter(s) /
Signature(s) of applicant(s) or representative(s) /
Signature(s) du (des) demandeur(s) ou du (des) mandataire(s)

46 Für Angestellte nach Artikel 133(3) Satz 1 mit allgemeiner Vollmacht / For employees under Article 133(3), 1st sentence, having a general authorisation / Pour les employés mentionnés à l'article 133(3), 1ère phrase, munis d'un pouvoir général

Nr. / No. / n° :

Ort / Place / Lieu: München

Datum / Date: 29 August 2000

DENDORFER Claus
European Patent Attorney

Name des (der) Unterzeichneten bitte in Druckschrift wiederholen. Bei juristischen Personen bitte die Stellung des (der) Unterzeichneten innerhalb der Gesellschaft in Druckschrift angeben. / Please print name under signature. In the case of legal persons, the position of the signatory within the company should also be printed. / Le ou les noms des signataires doivent être indiqués en caractères d'imprimerie. S'il s'agit d'une personne morale, la position occupée au sein de celle-ci par le ou les signataires doit être indiquée en caractères d'imprimerie.

Empfangsbescheinigung / Receipt for documents / Récépissé de documents

6

(Liste der diesem Antrag beigefügten Unterlagen) (Checklist of enclosed documents) (Liste des documents annexés à la présente requête)

Es wird hiermit der Empfang der unten bezeichneten Dokumente bescheinigt / Receipt of the documents indicated below is hereby acknowledged / Nous attestons le dépôt des documents désignés ci-dessous

Wird im Falle der Einreichung der europäischen Patentanmeldung bei einer nationalen Behörde diese Empfangsbescheinigung vom Europäischen Patentamt übersandt, so ist sie als Mitteilung gemäß Regel 24(4) anzusehen (siehe Feld RENA). **Nach Erhalt der Mitteilung nach Regel 24(4) sind alle weiteren Unterlagen, die die Anmeldung betreffen, nur noch unmittelbar beim EPA einzureichen.** / If this receipt is issued by the European Patent Office and the European patent application was filed with a national authority it serves as a communication under Rule 24(4) (see Section RENA). **Once the communication under Rule 24(4) has been received, all further documents relating to the application must be sent directly to the European Patent Office.** / Si, en cas de dépôt de la demande de brevet européen auprès d'un service national, l'Office européen des brevets délivre le présent récépissé de documents, ce récépissé est réputé être la notification visée à la règle 24(4) (cf. rubrique RENA). **Dès que la notification visée à la règle 24(4) a été reçue, tous les autres documents relatifs à la demande doivent être adressés directement à l'OEB.**

Dr. Claus Dendorfer
Wächtershäuser & Hartz
Tal 29

80331 München

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Anmeldenummer / Application No. / N° de la demande			
Tag des Eingangs (Regel 24(2)) / Date of receipt (Rule 24(2)) / Date de réception (règle 24(2))	DREC		
Zeichen des Anmelders/Vertreters / Applicant's/ Representative's ref. / Référence du demandeur ou du mandataire	AREF		
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			Stückzahl / Number of copies / Nombre d'exemplaires	Blattzahl* eines Stücks / Number of sheets* in each copy / Nombre de feuilles* par exemplaire	Gesamtzahl der Abbildungen* / Total number of figures* / Nombre total de figures*
A.	**Anmeldungsunterlagen und Prioritätsbeleg(e) / Application documents and priority document(s) / Pièces de la demande et document(s) de priorité**	47			
1.	Beschreibung (ohne Sequenzprotokollteil) / Description (excluding sequence listing part) / Description (sauf partie réservée au listage des séquences)		3	11	
2.	Patentansprüche / Claim(s) / Revendication(s)		3	2	
3.	Zeichnung(en) / Drawing(s) / Dessin(s) DRAW 1 #		3	4	16
4.	Sequenzprotokollteil der Beschreibung / Sequence listing part of description / Partie de la description réservée au listage des séquences				
5.	Zusammenfassung / Abstract / Abrégé		3	1	
6.	Übersetzung der Anmeldungsunterlagen / Translation of the application documents / Traduction des pièces de la demande				
7.	Prioritätsbeleg(e) / Priority document(s) / Document(s) de priorité				
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B.	**Der Anmeldung in der eingereichten Fassung liegen folgende Unterlagen bei: / This application as filed is accompanied by the items below: / A la présente demande sont annexées les pièces suivantes:**	48	
1.	Einzelvollmacht / Specific authorisation / Pouvoir particulier		
2.	Allgemeine Vollmacht / General authorisation / Pouvoir général		
3.	Erfindernennung / Designation of inventor / Désignation de l'inventeur		
4.	Früherer Recherchenbericht / Earlier search report / Rapport de recherche antérieure		
5.	Gebührenzahlungsvordruck (EPA Form 1010) / Voucher for the settlement of fees (EPO Form 1010) / Bordereau de règlement de taxes (OEB Form 1010)		X
6.	Scheck *(nicht bei Einreichung bei den nationalen Behörden)* / Cheque *(not when filing with national authorities)* / Chèque *(pas de chèque en cas de dépôt auprès des services nationaux)*		
7.	Datenträger für Sequenzprotokoll / Data carrier for sequence listing / Support de données pour liste de séquences SEQL 4		
8.	Zusatzblatt / Additional sheet / Feuille additionnelle		
9.	Sonstige Unterlagen (bitte hier spezifizieren) / Other documents (please specify here) / Autres documents (veuillez préciser)		
C.	**Kopien dieser Empfangsbescheinigung / Copies of this receipt for documents / Copies du présent récépissé de documents**	49	2 Anzahl der Kopien / Number of copies / Nombre de copies

Währung Betrag / Currency Amount / Monnaie Montant
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EUR 877,--

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Name des Einzahlers
Dr. Claus Dendorfer

Anschrift
Wächtershäuser & Hartz

Tal 29

D-80331 München

Zeichen des Einzahlers/Austraggebers
CED-11227

Zahlungsart
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☒ Abbuchung vom beim EPA geführten laufenden ② Konto wird beantragt
Nummer des laufenden Kontos 28000877

Aktenzeichen der Patentanmeldung/des Patents (für jedes Aktenzeichen ein Formblatt)

Zahlungszweck EP PCT

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⑤ Bei der Zahlung von Erstreckungsgebühren ist anzugeben, für welche Staaten diese Gebühren bestimmt sind.

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002	Recherchengebühr	EUR	690,--
005	Benennungsgebühr(en) ④	EUR	
015	Anspruchsgebühr(en) (Regel 31(1)	EUR	40,--
055	Zusätzliche Kopie	EUR	20,--
006	Prüfungsgebühr	EUR	
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034	Jahresgebühr für das 4. Jahr	EUR	
035	Jahresgebühr für das 5. Jahr	EUR	
	Erstreckungsgebühr(en) für ⑤:	EUR	
		EUR	
		EUR	
		EUR	
		EUR	
		EUR	
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	Gesamtbetrag	EUR	877,--

Unterschrift

Ort,Datum Munich, 29 August 2000

EPA Form 1010 03.94

Dr. Claus Dendorfer, European Patent Attorney

Providing and using predefined part data for a CAD program

The present invention concerns the field of computer aided design (CAD) and in particular the field of using predefined part catalogs in connection with CAD techniques.

The use of CAD techniques has become common engineering practice. The available CAD programs range from simple drawing tools to sophisticated systems covering the whole range of product design and possibly further aspects like engineering or manufacturing or quality control. The term "CAD program" as used herein should therefore be understood in its broadest meaning as any computer program that contains a drawing and/or design component and possibly further components, and the term "CAD model" should be understood as any model or document processed by a CAD program. The word "part" is used to designate any object, element or feature that is useful for designing a CAD model. While a part in this sense will normally represent a tangible object like a motor or a ball bearing, it may also be a constructive feature like a groove or a hole.

A present trend in the further development of CAD techniques is the increasing use of predefined part catalogs or libraries. The engineer chooses suitable part definitions for his or her design project and inserts these parts into the CAD model. Such part definitions may come from a variety of sources like the manufacturer of the CAD program or an independent developer or, most importantly, the manufacturer of the actual (physical) parts. Similarly to a good part catalog on paper, the availability of good part definitions in electronic form may greatly increase the manufacturer's revenue since many engineers will then specify these parts in their designs. Therefore many manufacturers invest a considerable amount of time and effort in the development and distribution of electronic part definitions that match their actually sold parts and components.

It is already known to provide predefined part definitions in electronic form for use in CAD models. However, the known techniques are less than perfect. One problem is that, after inserting the predefined part into the CAD model, the

designer must in many cases position the part manually with respect to both its position and its orientation. This process requires considerable time and effort and may even lead to design errors or to a lower accuracy of the finished CAD model. The consequence of these difficulties may be that the acceptance of predefined parts is not as high as it could be, especially if the predefined part has a comparatively simple graphical representation that could also be created by the designer "on the fly".

An object of the present invention is therefore to solve the above-mentioned problems at least to some extent. A particular object of the invention is to provide a way of improving the usability of predefined parts for CAD models. Further objects of the invention are to make the process of designing CAD models less costly and to assist the designer in producing high quality CAD models.

The present invention proposes to solve the above-mentioned objects by methods having the features of independent claims 1 and 3 as well as by a CAD program having the features of claim 8, an apparatus having the features of claim 9 and a computer readable data medium having the features of claim 10. The dependent claims define preferred embodiments of the invention. In the terminology used herein, a "data medium" is any entity that may be used for carrying information. This includes tangible media like magnetic and optical computer disks or tapes as well as intangible media like electric or electromagnetic or optical signals.

The present invention is based on the idea of providing and using predefined part data that comprises a plurality of insertion point specifications, wherein each insertion point specification defines one possible way of inserting the predefined part into the CAD model with respect to both its location and its orientation. This idea has the considerable advantage that exactly defined insertion points may be used by the designer for a wide variety of designs. The difficulties, errors and inaccuracies associated with manual shifting and/or rotating operations are avoided, and both the quality of the finished CAD model and the efficiency of the design process are improved. The detailed description of the embodiments, especially those shown in Fig. 1A - Fig. 4C, indicates further advantages of the present invention.

In preferred embodiments of the present invention, each insertion point specification of a predefined part comprises a location specification defining a location of an insertion point and an orientation specification defining an insertion coordinate system. When inserting such a predefined part, it is preferred to shift the part such that the location of the insertion point matches a reference point in the CAD model. Furthermore, the predefined part is preferably rotated such that the insertion coordinate system matches a reference coordinate system in the CAD model. This assumes that one insertion point specification of the predefined part has been selected or chosen for the insertion process.

It is further preferred to provide functionality that allows the designer to define and/or change the size of the predefined part when inserting it into the CAD model. The selected insertion point preferably remains a fixed point (e.g., the center point of a linear stretching or compression operation) when the size of the predefined part is defined and/or changed. This feature is especially useful since it allows quick adaption of a predefined part to the actual design requirements. Choosing a suitable insertion point in this case avoids the need for defining extensive auxiliary structures, which would have to be modified whenever the part is resized.

Preferred embodiments of the computer readable data medium, the CAD program and the apparatus of the present invention also comprise features corresponding to the features described above and/or to the features defined in the dependent method claims.

Further features, objects and advantages of the invention will be apparent from the following detailed description of several sample embodiments thereof. Reference is made to the schematic drawings, in which:

Fig. 1A - Fig. 1C show an I beam as an example of a predefined part with three different insertion points,

Fig. 2A - Fig. 2C show three different CAD models into which the I beam of Fig. 1A - Fig. 1C may be inserted,

Fig. 3A - Fig. 3C show the result of inserting the I beam of Fig. 1A - Fig. 1C into the CAD models of Fig. 2A - Fig. 2C, respectively,

Fig. 4A shows a shaft with a ball bearing as a CAD model,

Fig. 4B shows the CAD model of Fig. 4A where a groove has been inserted into the shaft,

Fig. 4C shows an enlarged representation of section C of Fig. 4B,

Fig. 5 shows a sample execution sequence of an embodiment of the present invention,

Fig. 6 shows a sample data structure of a part definition,

Fig. 7A shows a first dialog box used for specifying an insertion point for a 2D part definition, and

Fig. 7B shows a second dialog box used for specifying an insertion point for a 3D part definition.

The predefined part 10 shown, as an example, in Fig. 1A - Fig. 1C is an I beam in a 2D representation and a direction of view along the main axis of the I beam. A first insertion point 12 is depicted in Fig. 1A at the rightmost end of the top face of the I beam. A first insertion coordinate system 14 has its origin at the first insertion point 12 and has an X axis that runs parallel to the top face of the I beam and a Y axis that runs normal thereto.

The first insertion point 12 is the default insertion point of the predefined part 10. However, according to the present invention, the definition of the predefined part 10 comprises further predefined insertion points. Fig. 1B shows the part 10 with a second insertion point 16 positioned in the middle of the top face of the I beam and a second insertion coordinate system 18. Fig. 1C shows a third predefined

insertion point 20 positioned in the center of the I beam and a third insertion coordinate system 22, which is oblique to the main faces of the I beam. Any orientation of the insertion coordinate system (e.g., 22) with respect to a main coordinate system of the part 10 can be specified when the definition of the predefined part 10 is created. It is to be noted that Fig. 1A - Fig. 1C show one and the same predefined part 10 comprising (at least) three insertion points 12, 16, 20. For example, the second and third insertion points 16, 20 have not been shown in Fig. 1A for the sake of clarity, but they are nevertheless contained in the definition of the predefined part 10.

The portion of the first CAD model 24 shown in Fig. 2A is an inner corner into which the I beam is to be fitted. The corner point has been designated by the user as a first reference point 26. Fig. 2A further depicts a reference coordinate system 28 that coincides with the global coordinate system of the CAD model 24.

Each insertion operation performed by the CAD program requires the user to specify a reference point (e.g., 26) that will be matched with the applicable insertion point (e.g., 12, 16, 20) of the predefined part (e.g., 10) in a snap-in operation. Furthermore, the predefined part (e.g., 10) will be oriented such that the insertion coordinate system (e.g., 14, 18, 22) coincides with the reference coordinate system (e.g., 28) of the CAD model (e.g., 24). The application of this general rule is shown in Fig. 3A for the example that the predefined part 10 is inserted with its first insertion point 12 into the CAD model 24 with its reference point 26. An exact positioning and orientation of the inserted part 10 is obtained since the first (default) insertion point 12 was by chance suitable for matching with the geometrically well-defined reference point 26.

A second CAD model 30 that poses more difficulties is shown in Fig. 2B. Here the I beam is to be inserted in the middle between two near-vertical walls. If the predefined part 10 had only the single possible insertion point 12 of Fig. 1A, it would be difficult to define a suitable reference point in the CAD model 30. The reference point would have to be displaced from the middle of the structure of Fig. 2B by an amount equal to half the width of the top face of the I beam. Even if the exact dimensions of the I beam are known, it would be a cumbersome

operation to define a suitable reference point. This difficulty is even greater in embodiments that allow the user to resize an inserted object "on the fly" since after each resize operation the I beam would have to be moved back to the middle of the structure of Fig. 2B.

The second insertion point 16 (Fig. 1B) of the predefined part 10 greatly increases usability of the part insertion system. The I beam can be inserted exactly in the middle of the structure of Fig. 2B if the second insertion point 16 is used together with a central (second) reference point 32. Defining the central reference point 32 is a straightforward operation using the geometric functions of the CAD program. Fig. 3B depicts the result of the insertion process. No further adjustments by the user are necessary. The predefined part 10 maintains its desired relation to the CAD model 30 even if it is resized by the user. This is because the resizing operation of the presently described embodiment is implemented so that the reference point used for insertion of the part 10 (e.g., central reference point 32) remains a fixed point when the part 10 is resized.

A second reference coordinate system 34 is shown in Fig. 2B. It is apparent from Fig. 3B that, when inserting the predefined part 10 into the second CAD model 30, the orientation of the predefined part 10 is changed (i.e., part 10 is rotated) such that the applicable insertion coordinate system 18 and the reference coordinate system 34 match. As a general rule in the present sample embodiment, the reference coordinate system (e.g., 34) by default coincides with the global coordinate system of the CAD model (e.g., 30). If, however, a reference point (e.g., 32) is located in the scope of some local coordinate system of the CAD model, then the reference coordinate system (e.g., 34) will match the local coordinate system. It is also possible for the user to override these default settings of the present sample embodiment, and to define a customized reference coordinate system (e.g., 34) that best fits his or her design objectives.

A third CAD model 36 with a central (third) reference point 38 and a third reference coordinate system 40 is shown in Fig. 2C. Again, the operation of inserting the I beam of Fig. 1C into the third CAD model 36 yields an accurate result without any subsequent "fine tuning" by the user (see Fig. 3C). It should be noted that any

such "fine tuning" would be especially cumbersome in the example of Fig. 3C since the third insertion point 20 is very close to the sides of the web of the I beam. If there was no predefined third insertion point 20, the use of any snap-in functionality for adjusting the I beam would likely lead to an arrangement wherein the reference point 38 is aligned with one of the sides of the I beam instead of its center.

Fig. 4A - Fig. 4C depict an example that would be extremely complex to design without the inventive functionality. Consider a CAD model of a shaft 42 having a shoulder that supports one side of a ball bearing 44 (Fig. 4A). A retaining ring (not shown) is to be used for fixing the ball bearing 44 on the shaft 42. The retaining ring rests in a groove 46 that is to be machined into the shaft 42 (Fig. 4B). This grove 46 is given as a predefined part. The present example therefore also demonstrates that predefined parts do not need to be tangible objects, but can also be holes in some entity of the CAD model or regions or sub-structures of that entity.

It is required from an engineering perspective that the retaining ring rests on the ball bearing 44 instead of the right hand shoulder of the groove 46. For this reason the ball bearing 44 should project over the right hand shoulder of the groove 46 by a small distance. This distance D is shown in Fig. 4C as 0.1 mm. The amount of the distance D is defined by the applicable drafting standard and will be suggested automatically by the CAD program. This avoids the need of looking up the amount of the distance D in a handbook.

It would be difficult and error-prone to position the groove 46 manually with the required accuracy. According to the present invention, this problem is solved by using a predefined part for the groove 46 that has an optional insertion point which is displaced from the shoulder of the groove 46 by 0.1 mm (the default insertion point may be, for example, the center of the groove 46). The groove 46 may then be inserted accurately by using this optional insertion point and a reference point in the CAD model that is defined as the intersection of the horizontal and vertical outer lines of the ball bearing 44 in Fig. 4C.

There are various possibilities for helping the designer choosing a proper insertion point. For example, the definition of the groove 46 may be associated with a definition of the corresponding retaining ring as a predefined part. When the designer selects the retaining ring, a suitable groove 46 and a suitable insertion point on this groove 46 (depending on the size of the retaining ring and on the currently used drafting standards) are automatically suggested. Another possibility would be to interactively ask the designer to indicate the intended use of the groove 46. Depending on the designer's answer, a suitable insertion point (corresponding to the applicable engineering or drafting standards) is proposed. However, even the most basic functionality of presenting the designer a list of possible insertion points with descriptive names represents a substantial improvement over the prior art.

While the above examples have been given for 2D parts and 2D models in order to explain the principles of the present invention more clearly, it as apparent that the same methods and functions can be applied in connection with predefined 3D parts and 3D models. Again, one of a plurality of insertion points defined for each 3D part may be chosen. The predefined 3D part is then inserted in a way that the selected insertion point coincides with the reference point and the insertion coordinate system matches the reference coordinate system. This insertion procedure may involve shifting and/or rotating the predefined 3D part along or about all three axes.

A possible execution sequence of a sample embodiment of the invention is shown in Fig. 5. This execution sequence depicts some of the communication steps between a server 50 and a client 52 and some of the processing steps at the server 50 and the client 52 when the insertion method according to the present sample embodiment is performed. The server 50 is a powerful computer that has access to a database containing a predefined parts catalog. The client 52 is a common personal computer (PC) or a workstation running a CAD program like, for example, the program AutoCAD® manufactured by Autodesk, Inc., USA. The server 50 and the client 52 are connected via a computer network like, for example, the Internet or an intranet.

The process of Fig. 5 starts with the designer requesting a suitable part for his or her CAD model. The designer enters a search query in which the kind of the requested part and optionally also a variety of attributes (e.g., size, material, price range, ...) are specified (step 54). The search query is then forwarded to the server 50 in step 56. The server 50 accesses the parts catalog database and looks for part definitions matching the search query (step 58). The search results, i.e., a list of the parts that have been found in response to the search query, are sent to the client 52 in step 60, and the parts list is displayed to the designer in step 62.

The designer reviews the displayed search results and selects a part from the list in step 64. In the present sample embodiment, each part description of the search result list can be expanded to show the names of all predefined insertion point specifications that are available for this part. It is also possible in some embodiments to show a preview of the selected part with a visible marker for each predefined insertion point. Besides selecting the part in step 64, the designer may also designate the desired insertion point either on the expanded result list or by using the part preview function. If no insertion point is specifically designated by the designer, the default (first) insertion point will be used.

After the designer has made his or her selection, data specifying which part has been chosen is sent to the server 50 in step 66. The server 50 then accesses the full definition 70 of the selected part in the parts catalog (step 68), and sends this part definition 70 to the client 52 in step 72. In the presently described embodiment, the part definition 70 contains all insertion point specifications predefined for the part, whereas in other embodiments only a single insertion point specification corresponding to the insertion point selected by the user in step 64 (or corresponding to the default insertion point) is transmitted. In still other embodiments, the full definitions 70 of all parts matching the designer's search query are transmitted to the client 52 in step 60 as the search result, such that steps 66, 68 and 72 are not needed.

When the part definition 70 has been received by the client 52, the part is inserted into the CAD model as described above in Fig. 1A - Fig. 4C (step 74). This insertion step 74 presupposes that a suitable reference point and a optionally also

a reference coordinate system have been defined by the designer either before execution of the method of Fig. 5 or in connection with step 74. The way in which such a reference point and/or coordinate system may be defined using the CAD program is well-known and therefore does not need to be described in detail. After insertion of the predefined part, the updated CAD model is displayed in step 76.

In the presently described sample embodiment, the designer now has the opportunity to change the insertion point (step 78). Preferably a single user action (e.g., pressing the tabulator key) is sufficient for stepping through all available insertion points of the selected part in a cyclic sequence. If necessary, the designer may also move (i.e., shift and/or rotate) or resize the inserted part manually (step 80). Any such interaction of the designer causes the CAD model to be re-displayed (loop 82). An important feature of the present sample embodiment is that the selected insertion point will not move when the part is resized in step 80. In other words, the selected insertion point of a fixed point or reference point under the resizing operation. This feature is very useful for the insertion of combined parts like, for example, a screw connection or a flanged motor.

In some embodiments, the CAD system may also perform an automatic resizing operation to adapt the inserted part to the dimensions of the existing CAD model and/or to given engineering standards. For example, when inserting a screw connection through several layers of material, the dimensions of the connection may be determined automatically from the CAD system's knowledge of the material thickness and the standard screw lengths. Again, the selected insertion point remains fixed under any such resizing operation.

A more detailed view of the data structure that defines one predefined part is given in Fig. 6. The part definition 70 is an encapsulated collection of all data items that are relevant for the designer and/or the manufacturer of the part. A geometric specification 84 of the part comprises the CAD display data that is included in the CAD model during insertion step 74. The part definition 70 further contains several insertion point specifications 86, 88, etc. Each insertion point specification 86, 88, etc. comprises a name of the insertion point as well as a location specification 90, 94, etc. and an orientation specification 92, 96, etc. While only two insertion

point specifications 86, 88 are shown in Fig. 6, an arbitrary number of further specifications may be present in the part definition 70.

Each location specification 90, 94, etc. essentially consists of the coordinates of the insertion point (e.g., 12, 16, 20) while each orientation specification 92, 96, etc. essentially consists of data defining the orientation of the insertion coordinate system (e.g., 14, 18, 22). The part definition 70 may contain further data like, for example, search and classification data as well as ordering and price information. This further data, however, is not essential with respect to the present invention and is therefore not described in detail in the present document.

Fig. 7A depicts a possible dialog box that is used for defining insertion points when a part definition 70 for a 2D part is created. A descriptive name of the insertion point may be entered into a text field 100. Button 102 allows the definition of the location of the insertion point. The insertion coordinate system can be defined by rotating the X axis using button 104. As an alternative, button 106 can be used to define the direction of the X axis of the insertion coordinate system as being parallel to a selected line of the predefined part. The new insertion point and the insertion coordinate system are displayed together with the predefined part. The corresponding insertion point specification (e.g., 86, 88) is created and added to the part definition (e.g., 70) when the "OK" button of the dialog box of Fig. 7A is pressed.

A similar dialog box for defining an insertion point of a 3D predefined part is shown in Fig. 7B. Further to the elements already present in the 2D version, the dialog box of Fig. 7B also allows rotation of the Y axis of the insertion coordinate system (button 108) and of its Z axis (button 110). Button 112 serves to align the Y axis with any selected line of the predefined part. A corresponding function could be provided for the Z axis, but tests have shown that this function is used very rarely.

It is apparent that the application possibilities and alternative embodiments described above represent just some examples, and that a wide range of further applications of the teachings of the present invention exist.

Claims

1. A method of providing data (70) defining a predefined part (10) for use in a CAD model (24, 30, 36) processed by a CAD program, said data (70) comprising a plurality of insertion point specifications (86, 88), each insertion point specification (86, 88) defining one possible way of inserting said predefined part (10) into said CAD model (24, 30, 36) with respect to a location and an orientation of a said predefined part (10) for insertion into said CAD model (24, 30, 36).

2. The method of claim 1, wherein each insertion point specification (86, 88) comprises a location specification (90, 94) defining a location of an insertion point (12, 16, 20) of said predefined part (10) and an orientation specification (92, 96) defining an insertion coordinate system (14, 18, 22) of said predefined part (10).

3. A method of using data (70) defining a predefined part (10) for use in a CAD model (24, 30, 36) processed by a CAD program, said data (70) comprising a plurality of insertion point specifications (86, 88), each insertion point specification (86, 88) defining one possible way of inserting said predefined part (10) into said CAD model (24, 30, 36) with respect to a location and an orientation of a said predefined part (10) for insertion into said CAD model (24, 30, 36).

4. The method of claim 3, wherein each insertion point specification (86, 88) comprises a location specification (90, 94) defining a location of an insertion point (12, 16, 20) of said predefined part (10) and an orientation specification (92, 96) defining an insertion coordinate system (14, 18, 22) of said predefined part (10).

5. The method of claim 3 or claim 4, wherein one insertion point (12, 16, 20) of said plurality of insertion point specifications (86, 88) is selected for inserting said predefined part (10) into said CAD model (24, 30, 36).

6. The method of claim 4 and claim 5, wherein said predefined part (10) is inserted into said CAD model (24, 30, 36) such that the location of said insertion point (12, 16, 20) of the selected insertion point specification (86, 88) matches a

reference point (26, 32, 38) in said CAD model (24, 30, 36) and the orientation of said insertion coordinate system (14, 18, 22) of the selected insertion point specification (86, 88) matches a reference coordinate system (28, 34, 40) in said CAD model (24, 30, 36).

7. The method of one of claims 5 to 6, further comprising the step of defining and/or changing the size of the predefined part (10), wherein the selected insertion point (12, 16, 22) remains a fixed point when the size of the predefined part (10) is defined and/or changed.

8. A CAD program adapted for employing the method of one of claims 3 to 7.

9. An apparatus comprising at least one computer, said computer being programmed for performing the steps of the method of one of claims 3 to 7.

10. A computer readable data medium comprising data (70) defining a predefined part (10) for use in a CAD model (24, 30, 36) processed by a CAD program, said data (70) comprising a plurality of insertion point specifications (86, 88), each insertion point specification (86, 88) defining one possible way of inserting said predefined part (10) into said CAD model (24, 30, 36) with respect to a location and an orientation of a said predefined part (10) for insertion into said CAD model (24, 30, 36).

11. The computer readable data medium of claim 10, each insertion point specification (86, 88) comprising a location specification (90, 94) defining a location of an insertion point (12, 16, 20) of said predefined part (10) and an orientation specification (92, 96) defining an insertion coordinate system (14, 18, 22) of said predefined part (10).

Abstract

Providing and using predefined part data for a CAD program

A method is proposed for providing data (70) defining a predefined part for use in a CAD model processed by a CAD program, said data (70) comprising a plurality of insertion point specifications (86, 88), each insertion point specification (86, 88) defining one possible way of inserting said predefined part into said CAD model with respect to a location and an orientation of a said predefined part for insertion into said CAD model. A method for using such data (70) comprises corresponding features, and a CAD program and an apparatus employ the method for using such data (70). A computer readable data medium is characterized in that is contains such data (70). The invention provides a way of improving the usability of predefined parts for CAD models.

(Fig. 6)

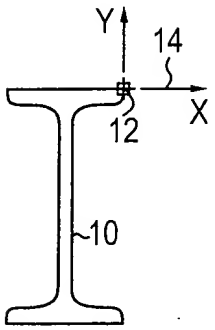

Fig. 1A

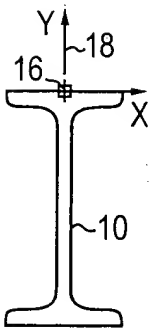

Fig. 1B

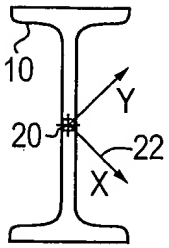

Fig. 1C

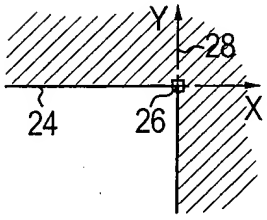

Fig. 2A

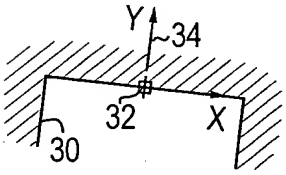

Fig. 2B

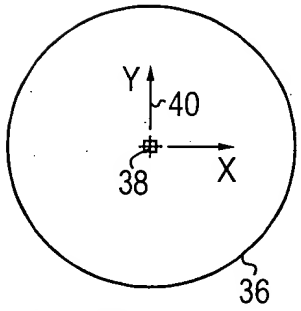

Fig. 2C

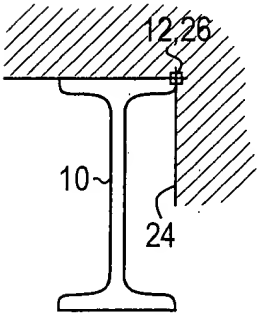

Fig. 3A

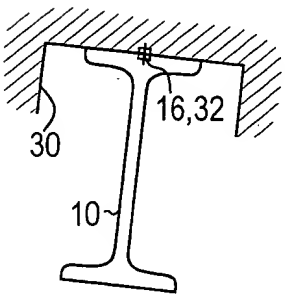

Fig. 3B

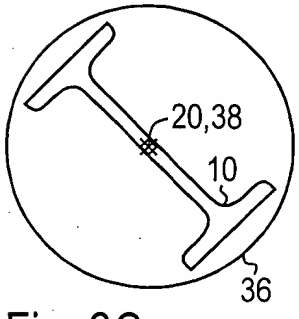

Fig. 3C

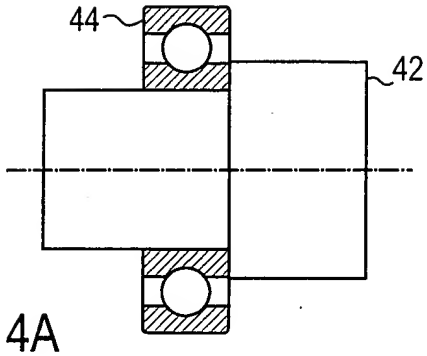

Fig. 4A

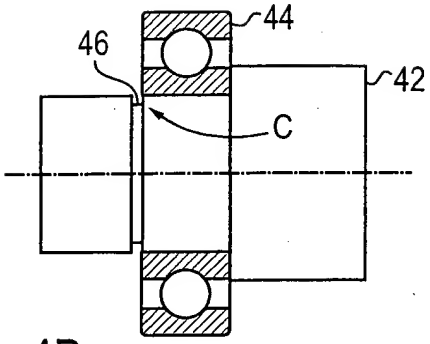

Fig. 4B

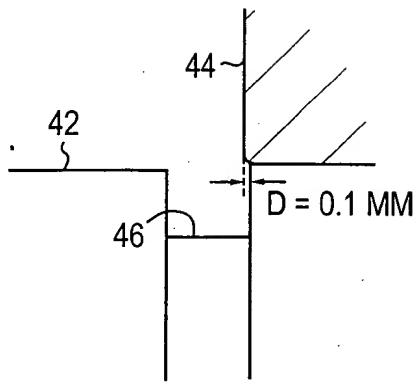

Fig. 4C

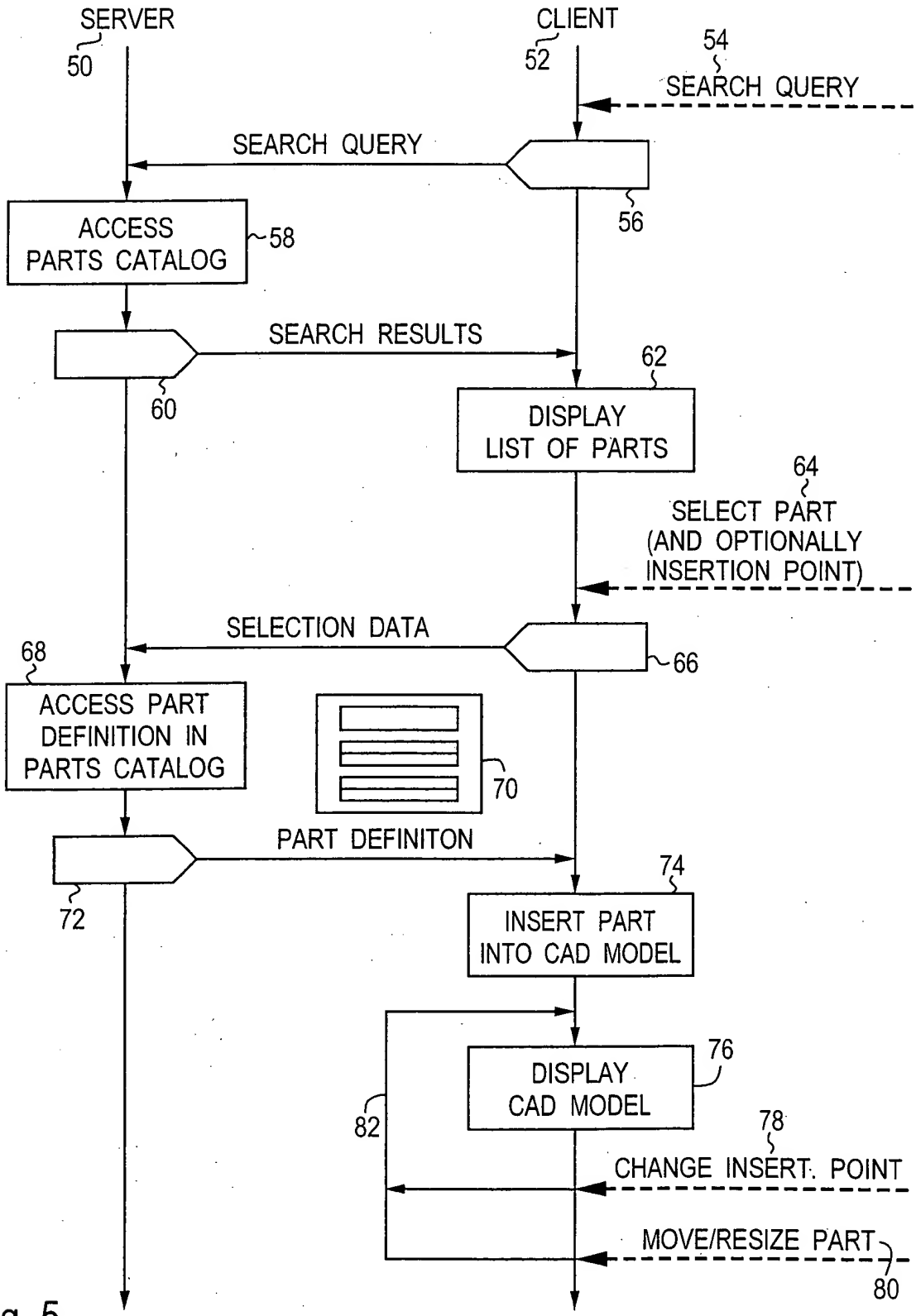
SERVER
50
CLIENT
52
54
SEARCH QUERY
SEARCH QUERY
56
ACCESS PARTS CATALOG
58
SEARCH RESULTS
60
62
DISPLAY LIST OF PARTS
64
SELECT PART (AND OPTIONALLY INSERTION POINT)
SELECTION DATA
66
68
ACCESS PART DEFINITION IN PARTS CATALOG
70
PART DEFINITON
72
74
INSERT PART INTO CAD MODEL
76
DISPLAY CAD MODEL
82
78
CHANGE INSERT. POINT
MOVE/RESIZE PART
80

Fig. 5

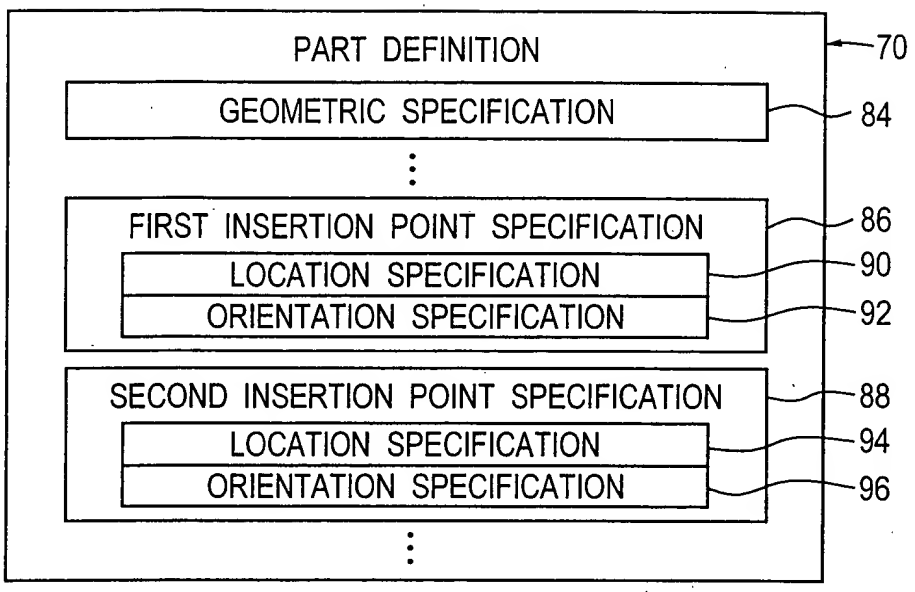

Fig. 6

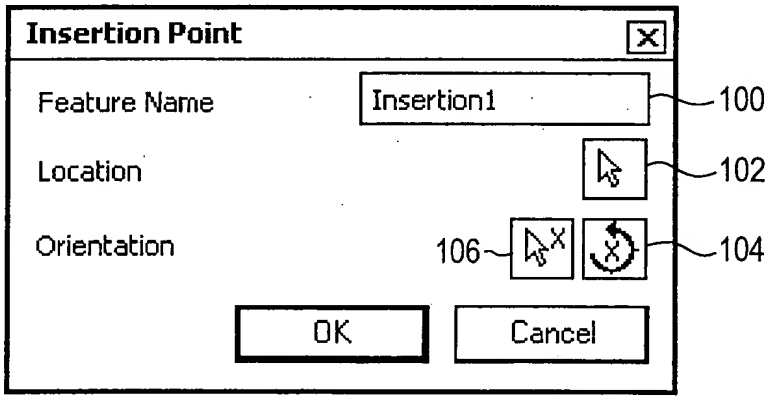

Fig. 7A

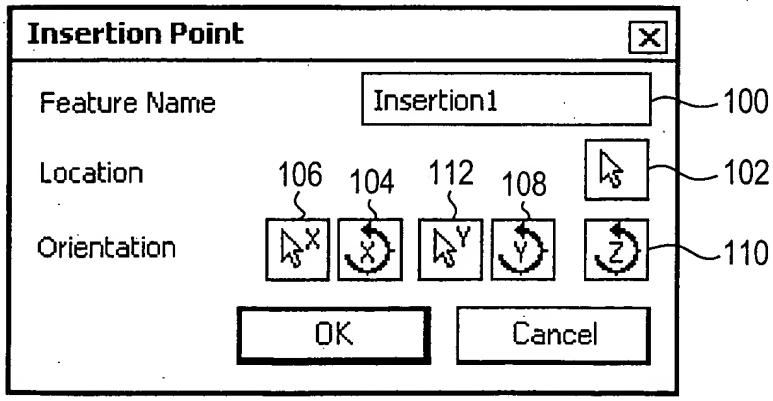

Fig. 7B